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OBSERVATIONS OF THE BINARY STARS δ EQUULEI (= O Σ 535.)
AND κ PEGASI (= β 989,) IN 1900.

In carrying out my programme of observing the more interesting and difficult binary stars annually, I turned the 36 inch telescope upon κ Pegasi on the night of July 22, 1900, and secured a measure without particular difficulty, though the distance between the two components was only 0".17. Turning next to δ Equulei, which is a very similar pair in point of magnitude, I was unable to make a measure. This was a great surprise to me; for a year ago it was much easier to measure than κ Pegasi, and my recollection of the generally accepted orbit did not lead me to expect so rapid a diminution in the distance.

On the night of August 10th, with rather poorer conditions, I again failed on δ Equulei, and turning directly afterward to κ Pegasi secured a satisfactory measure. On the following night, Saturday, August 11th, the seeing was excellent, and I was able to detect a slight, but certainly real elongation of δ Equulei, regarding which my observing note says "the distance (between the two components) is not greater than the thickness of the micrometer-wire,"—i. e., less than one tenth of a second of arc. Perhaps the best estimate of the observing conditions on this night may be formed from the fact that in little over five hours I secured measures of eighteen pairs of double stars, ten of which had distances of less than 0".25 and only three, distances greater than 0".50. Having measured a pair with a distance of 0".15 shortly before turning to δ Equulei, and κ Pegasi (distance 0".17) immediately afterward, I am confident that the observing note just quoted states the distance correctly.

After failing again, on September 8th, to see any elongation in this star, though the seeing was good enough to make possible the measures of seven other pairs at an average distance of 0".30, I called the attention of Professor HUSSEY, who is specially interested in the OTTO STRUVE double stars at present, to δ Equulei. For it was obvious that the existing orbits needed radical modifications to account for so small a separation between the two components at the present time. According to Dr. SEE'S revised orbit, the latest one published, the distance has been diminishing during the past two years, but at the date, 1900.85 (about November 7th) it should still be 0".28, an easily measurable quantity with the 36-inch refractor on any good night.

In the past two months I have examined δ *Equulei* on four nights when the seeing was good enough to measure very close stars. Three times I suspected elongation; once I failed completely. Settings were made on the suspected elongations, but were marked "uncertain," — particularly the last two — and the resulting angles differed so greatly that they seemed more than ever doubtful.

The short period elements, however, which Professor HUSSEY has recently completed (see p. 215 of this number), without reference to any of these observations, except the one on August 11th, indicate that in all probability the elongations noted were real; for, according to these elements, the distance during the past few months has been considerably less than $0''.10$, and therefore a residual in angle of even 28° means a displacement of the micrometer-wire of only one third of its own thickness.

In view of the very interesting result obtained by Professor HUSSEY in his study of the orbit of this star, it has seemed desirable to make this detailed record of my observations. The tabular statement is as follows: —

| Date. | Position-Angle. | Distance. | Eye-piece. | Seeing. |
|----------|--|-----------|------------|---------|
| 1900 557 | Failed to measure | | 1900 | 3 |
| .609 | Failed to measure | | 1500 | 3 |
| .612 | $137^\circ.8$ ($317^\circ.8$)... $< 0''.10$ | | 2600 | 4+ |
| .688 | No elongation seen | | 1900 | 3 |
| .746 | Elongat'n suspect'd in $107^\circ.2$ $< 0''.10$ | | 2600 | 4 |
| .787 | Two micrometer settings gave an angle of $95^\circ.3$. My observing note says: "Settings quite uncertain, but star certainly elongated in general preceding following direction." | | 1900 | 3 |
| .836 | No elongation seen | | 1900 | 3 |
| .858 | One "very uncertain" setting gives an angle of 84° | | 1900 | 3 |

The measures of κ *Pegasi* are as follows: —

| | | | | |
|----------|---------------|----------|------|----|
| 1900.557 | $272^\circ.8$ | $0''.17$ | 1500 | 3 |
| .576 | $267^\circ.2$ | $0''.17$ | 1500 | 3 |
| .609 | $266^\circ.1$ | $0''.18$ | 1500 | 3 |
| .612 | $265^\circ.0$ | $0''.17$ | 1900 | 4+ |
| 1900.59 | $267^\circ.8$ | $0''.17$ | | |

According to BURNHAM's elements for this pair, the position in 1900.59 was $263^{\circ}.5$ and $0''.16$, leaving residuals for the above observations of $(O - C) + 4^{\circ}.3$ and $+ 0''.01$. As the smaller star has moved over an arc of 220° since these elements were computed, such an agreement between prediction and observation indicates that BURNHAM's orbit is very exact.

November 16, 1900.

R. G. AITKEN.

LEONIDS IN 1900.

About a week previous to November 15th, a number of meteors were seen which appeared to come from the *Leonid* radiant. All were seen well toward the western horizon, and had the characteristics of the *Leonids*. No especial watch was kept for them then. On the morning of Thursday, November 15th, meteors were counted from $15^h 15^m$ to $15^h 55^m$. During this time nine were seen, of which eight were *Leonids*. None were of unusual brilliancy. Attention was directed more to the western sky on account of greater cloudiness to the east. Clouds at all times covered considerable portions of the sky so that probably not more than half as many meteors were observed as would have been visible in an entirely clear sky. A severe storm (still in progress) has prevented further observations.

MT. HAMILTON, November 21, 1900.

C. D. P.

OBSERVATIONS OF LEONID METEORS.

Six meteors coming approximately from the position of the Sickle in *Leo* were observed this (Thursday) morning between half-past three and four o'clock P. S. T. The sky was cloudy throughout the morning, during the interval of observation from three tenths to five tenths being covered. Most of the meteors were faint, and were observed in the western sky, this being the part most free from clouds. No other meteors were seen.

November 15, 1900.

W. H. W.

OBSERVATIONS OF LEONIDS ON THE MORNING OF NOVEMBER 15TH.

In making these observations no attempt was made to record the separate paths of the meteors, all meteors emanating from the constellation *Leo* being counted together. The observations extended from 2:55 to 4:30 A. M., being taken during alternate intervals of five minutes throughout this time. Ten *Leonids* in